

NOS SCIENCE POLICY

COASTAL STEWARDSHIP

NOAA is committed to conserving the nation's coastal resources and habitats for future generations. As a home of science, resource management, and operational programs, NOS has a vital responsibility and unique opportunity to lead NOAA's broad-based coastal stewardship efforts. NOS science is diverse and organizationally dispersed but shares a common unifying purpose to further NOAA's coastal stewardship mission. Within that missions, the NOS focus includes conserving and managing near shore marine, estuarine, and Great Lakes areas, including protected areas of unique national significance; ensuring the quality of the nation's coastal waters and ecosystems; protecting and conserving marine resources; and providing technical support to maritime and other users of the Exclusive Economic Zone (EEZ). NOS is a leader for NOAA interactions with other Federal agencies on issues and problems dealing with the coastal systems.

NOS MISSION

The NOS Mission is to be the Nation's principal advocate for coastal and ocean stewardship through development, with partners at all levels, of the National foundation for coastal and ocean science, management, response, restoration, and navigation, while adapting to the changing natural environment and economy.

NOS SCIENCE MISSION

The NOS science mission is to develop and provide access to reliable and sound scientific information and understanding of coastal systems, human use issues, and interactions among natural systems and humans primarily for the effective management and stewardship of the nation's coastal ecosystems.

SCIENCE GOALS

The NOS Science Goals are to:

Acquire the ability to understand and predict coastal system dynamics to improve the scientific basis for decision making.

Build integrated and comprehensive science capabilities in NOS.

Deliver results from objective research, monitoring, assessment, and technical assistance programs to NOAA and other constituents.

SPECTRUM OF SCIENCE ACTIVITIES

Coastal science includes programs of research, monitoring, assessment, technical assistance, and information transfer that address both long-term and short-term needs. Research and monitoring define the nature of the scientific inquiry whereas assessment, technical assistance, and information transfer describe mechanisms for synthesis, delivery, or building capacity to understand the scientific or technical information or issues. Individual science projects or programs range in scope and complexity from short-term, issue driven efforts targeting specific resource management needs in a marine protected area to the equally important need for broader, long-term and interdisciplinary analyses and modeling of the complex ecological and environmental processes that affect the nation's coastal systems.

Geographic and Disciplinary Scope- Coastal ecosystems include the physical, biological, chemical, geological, social, economic, and cultural components of the Nation's bays and estuaries, the Great Lakes, and the coastal ocean to the outer edge of the U.S. Exclusive Economic Zone. It also includes the need to address the important and complex linkages with upland watersheds and airsheds and the open ocean and to be involved with international coastal science programs. Coastal science is carried out throughout NOS, includes most scientific disciplines applicable to coastal systems, and has a focus on cross-cutting, multidisciplinary inquiries that integrate different disciplines to resolve particular coastal problems.

Research- Research focuses on integrated, interdisciplinary environmental, social, and economic research to improve our understanding and ability to predict coastal ocean processes and to support resource management and environmental services. With an emphasis on ecosystem approaches to problem-oriented research, short-term and long-term efforts are conducted through field and laboratory investigations, modeling, and retrospective analysis. Anticipated outcomes include an improved understanding and ability to predict how the coastal ocean functions in support of living marine resources, marine services, protection of life and property, and community development. Emphasis is placed on obtaining a basic understanding of ecosystem processes and the interactions of natural environmental variability and human activities. Research is conducted in both disturbed and undisturbed areas, with a strong emphasis on developing models to predict the effects of natural variability and human activities on the health and services of the coastal ocean. The strength of NOS science is its ability to support the wide range of research required to understand and manage coastal ecosystems in both the short and long term.

Monitoring- Monitoring is the periodic or continuous measurement of specific environmental properties and the processing, analysis, and dissemination of the resulting data and information to answer specific questions regarding the state and functioning of the coastal environment and its contained ecosystems. There are a number of purposes for such monitoring. In the context of NOAA's coastal missions, these purposes are to evaluate the condition or health of the environment and how this changes with time, the severity of environmental problems and the levels of environmental stresses to which the environment is being subjected and how these change with time, the effectiveness of coastal resource management actions and programs, the potential designs and strategies for resource management actions and plans, and the validity of models used to predict the consequences of such actions and plans.

Assessment- Assessment integrates planning and analysis to synthesize information for management and policy decisions. Assessments provide an understanding of the status and trends of a coastal resource or critical environmental properties, an evaluation of the causes and consequences of those trends, future projections of those environmental conditions under various management or policy alternatives, and an analysis of the social and economic impacts of those alternatives. As a basic element of coastal management, assessments are formulated on a management-focused thematic basis. However, as a synthesis of science, assessments also focus on important and often controversial scientific issues. As a fundamental bridge between science, management, and public policy, assessments seek maximum use of existing information and expertise and ensure the widest transfer possible of experience, methods, and tools. Federal-level assessments are conducted on management and policy themes directed primarily at national, regional, and state issues, but may include local issues as appropriate.

Technical assistance and information transfer- Technical assistance and information transfer provide linkages between science output and the needs, wants, and desires of NOAA customers. Functions which relate to the transfer or implementation of the results of scientific inquiry are an integral part of NOS Science. Technical assistance increases access to information, techniques, summaries, tools, and expertise. It improves our understanding of a particular problem or issue, synthesizes information on a given topic, analyzes and evaluates that information, and provides access to expertise to evaluate or apply technical information.

Integration- Monitoring, research, assessment, technical assistance, and information transfer are necessary and complementary components of an overall scientific agenda. There is clearly a need to connect the basic understanding and predictive capability developed through research, the long-term and large-scale data that monitoring provides for baseline information and evaluating a system's response to management decisions, assessment that provides the interface between this information and management, and the transfer of technology and innovations to the coastal constituents. Since the capabilities to deliver these elements resides throughout NOS, NOAA, and the broader set of partners, NOS encourages a broad-based, rigorous, and focused effort to engage the various partners in the integration and mutual development of these components of science.

SCIENCE IN THE NATIONAL OCEAN SERVICE

Throughout NOS, science is conducted and used to further the agency's coastal stewardship missions. NOS Science incorporates the full range of the scientific process from primary research to monitoring to assessment to information and technology transfer. The following paragraphs provide a summary of the scientific activities within NOS.

National Centers for Coastal Ocean Science

The National Centers for Coastal Ocean Science (NCCOS) provide a rigorous, objective, and innovative scientific core on which NOS can build its management, scientific, and operational programs. NCCOS is comprised of five centers: Center for Coastal Monitoring and Assessment, Center for Sponsored Coastal Ocean Research, Center for Coastal Fisheries Habitat Research at Beaufort, Center for Coastal Environmental Health and Biomolecular Research at Charleston, and the Great Lakes Environmental Research Laboratory.

The Centers conduct long and short term research, monitoring, assessment, prediction, synthesis, and information transfer in support of the NOS coastal stewardship mission. NCCOS expertise covers a wide range of scientific disciplines and specialities related to marine and aquatic systems, e.g., chemistry, biology, ecology, oceanography, limnology, toxicology, biotechnology, hydrology, and risk assessment. Areas in which NCCOS is actively engaged include:

- C coastal ecosystem research and monitoring including biogeographic and physical environment assessments, habitat condition, and status of/changes in biotic productivity
- C processes governing harmful algal blooms, eutrophication, and related phenomena and their relation to environmental conditions
- C culture of toxic algae; extraction, purification, and molecular structure of the toxins; and development of detection methods
- C anthropogenic influences on coastal resources, including the effects of toxic contaminants and other cumulative stresses on marine animals and humans
- C hydrologic impacts (water levels and salinity regimes) resulting from climate changes and the potential effects on biodiversity
- C natural hazard prediction and mitigation to reduce impacts on coastal property and environment
- C marine forensics to determine causes of mortality and/or disease among protected resources
- C health assessment of marine mammals to provide comparative benchmarks for future measurements
- C development of biomolecular probes and genetic techniques for specific applications, e.g., fish population/stock structures, detection of exposure to toxins
- C nature and effects of pathogenic organisms as they effect the health of both marine life and human populations
- C rapid response (e.g., field investigations, sample analysis, information assessment) to episodic events such as hazardous material releases into the coastal environment, unusual mortality events and animal strandings, and harmful algal blooms
- C habitat restoration and living resource dependencies

The Centers sponsor, organize, and lead scientific workshops, and serve as sources of information, technology, and training in highly specialized areas. Center staff serve regularly on state/federal committees, workshops, scientific panels, and interagency work groups. In the research arena, high priority is placed on maintaining strong working partnerships with academic

institutions through competitive, peer-reviewed joint projects with academic scientists, collaborative studies, placement of undergraduate and graduate students in Center science programs, and postdoctoral staff appointments across the five Centers.

Coastal Services Center

The Center's mission is to foster and sustain the economic and environmental well-being of the Nation's coasts by linking people, information and technology. Central to this mission are partnerships and the delivery of products and services tailored to meet the needs of state and local coastal resource managers. Because the Center seeks to bridge the gap between coastal science and management, the majority of its' work focuses on applications and technical assistance rather than original research. Areas of applied technical expertise resident at the Center include:

- C Analysis and interpretation of satellite and aircraft derived imagery to detect temporal and spatial changes in land cover and aquatic vegetation.
- C Development of aircraft and satellite-borne remote sensing techniques and products supporting: harmful algal bloom monitoring, tracking and prediction; coastal pollution and eutrophication; coastal ocean habitat trends; and high-resolution coastal topography and erosion.
- C Specialized training, including support of coastal management and minority fellowships, to develop state and local capacities in: the utilization of advanced technologies and geographic information systems (GIS); access to information and compliance with FGDC standards and metadata requirements; community-based coastal hazard mitigation training; and workshop, conference and meeting support services.
- C Application of social science, evaluation, survey and customer interaction expertise to management needs and improvement of services and products.
- C Application of geographic information system technologies to the management of coastal resources, including issues such as ocean governance, coastal hazards, habitat, shoreline delineation, and protected area management.
- C Programming and database management.
- C Watershed management support through creation of restoration plans, information syntheses, and integration of watershed-level ecological modeling into GIS platforms.
- C Improved access to products, data, publications, tools and information for coastal areas via the Internet.
- C Identification of emerging technologies for improved coastal resources management and commercialization, including development of methodologies and physical capacities to assess and test technologies and sensors for environmental monitoring, response and restoration.
- C Creation of image-derived products from classified sources.
- C Coastal hazard risk and vulnerability assessment, planning assistance and training, including the development of interactive decision-based tools and modeling techniques for hazards planning and mitigation.
- C Process consultation, facilitation, mediation and collaborative problem solving in support of coastal management activities.

Office of Ocean and Coastal Resources Management

The Office of Ocean and Coastal Resources Management (OCRM) has the broad statutory responsibility to manage a range of the nation's coastal and ocean resources, habitats and ecosystems. OCRM's three management programs, National Marine Sanctuaries, National Estuarine Research Reserve System (NERRS), and Coastal Zone Management rely heavily on, and are actively involved in, science and technical assistance to fulfill NOS's stewardship mission. Within the 12 Marine Sanctuaries and 24 Estuarine Reserves, OCRM's technical staff play a major role in the design, planning, funding, coordination, conduct, oversight and evaluation of a wide range of science and technical programs, including research; monitoring; habitat assessment, characterization, mapping and restoration; the development and testing of environmental technology (NERRS); and the training of graduate students through research fellowships (NERRS). In conjunction with the 31 state Coastal Zone Management programs, OCRM also sponsors a variety of science and technical assistance efforts aimed at habitat and resource conservation, brownfields mitigation and waterfront revitalization, beach erosion and closure, and the reduction of non-point pollution.

Office of Response and Restoration

The Office of Response and Restoration (ORR) conducts science to strengthen its capabilities in responding to spills of hazardous materials, threats from waste sites, and assessing damages that result from impacts to NOAA's trust resources. The goal of the response is to minimize environmental and human health impact and provide sound scientific basis for ecological risk assessment and restoration activities. In particular, spill related research is conducted to better predict the movement and behavior of pollutants, effects of pollutants and/or clean-up on different ecosystems, feasibility of alternative response technologies, and recovery of impacted areas.

Science conducted in support of waste sites is intended to improve remedial decision making with the goal of protecting and restoring natural resources under NOAA's trusteeship. Applied research conducted in support of decision making at hazardous waste sites includes evaluating fate and transport of contaminants in the environment; evaluating the potential of specific contaminants or mixtures to cause harm to NOAA trust resources; evaluating which adverse biological effects are ecologically significant and determining acceptable threshold effect concentrations for contaminants of concern; conducting evaluations of whether removal/remedial actions reduced ecological threats; and determining best approaches to restore habitats injured by releases of hazardous substances.

The Damage Assessment Center conducts science on evaluating impacts to NOAA trust resources, determining the methods or techniques for valuation of resources or ecosystems and assessing feasibility and efficacy of restoration activities.

Office of Coast Survey

Scientific efforts in the Office of Coast Survey (OCS) are generally focused on the development and/or improvement of cartographic, hydrographic, and oceanographic systems and techniques used by OCS and NOS to provide products and services for the coastal marine community, especially in support of safe navigation and the utilization, protection and preservation of the coast. The majority of these scientific efforts (especially longer-term research and development projects) are conducted in the Coast Survey Development Laboratory (CSDL). These efforts include the development and application of new technology, techniques, and software for:

- C improving electronic chart systems
- C building vector databases for marine GIS's (including bathymetry, shoreline, bottom characteristics, and oceanographic parameters)
- C efficiently and accurately measuring depths, determining bottom characteristics and locating underwater hazards
- C accurately predicting water levels, currents, and other oceanographic parameters (using sophisticated oceanographic and meteorological numerical model systems)
- C improving on-the-fly global positioning system (GPS) techniques and their application
- C improving and applying data from remote sensing measurements systems, including acoustic, laser, radar, and satellite systems.

Scientific expertise in CSDL includes the following disciplines: physical oceanography (including numerical modeling, data analysis techniques, and instrumentation), meteorology, hydrography (including acoustic, laser, and GPS techniques), cartography (including GIS), geography, geology (bottom characteristics), and software engineering.

National Geodetic Survey

The National Geodetic Survey (NGS) conducts research to develop techniques to improve the accuracy and precision of 3-dimensional position measurement and to monitor the temporal stability of these measurements. NGS also evaluates new technologies to conduct mapping of U.S. shorelines.

NGS is investigating the following topics:

- C Calibrating GPS antennas to improve vertical accuracy
- C Monitoring subsidence at selected tide gauges to separate vertical land movements from apparent sea level changes
- C Using absolute gravity measurements to determine vertical rates of movement due to glacial rebound and contemporary glacial melting,
- C Developing kinematic positioning techniques to enhance such remote sensing capabilities as photogrammetry, altimetry, and airborne gravity
- C Improving the estimation of GPS orbits
- C Using GPS to estimate total electron content of the ionosphere to evaluate the effects of space weather variations on position measurements

- C Incorporating marine measurements into an ellipsoidal datum directly through the use of GPS-equipped buoys
- C Analyzing digital terrain data and gravity reduction techniques for high resolution geopotential computations
- C Evaluating synthetic aperture radar (SAR) to establish SAR-derived shoreline accuracies through photogrammetric comparisons.

Special Projects Office

The mission of the Special Projects Office (SPO) is to provide expertise, products, and services that help the National Ocean Service to design and implement an enhanced program of coastal stewardship throughout the agency. To achieve this mission, the Special Projects: 1) Facilitates the development of integrated strategies that promote cooperation throughout the agency; 2) Conducts unique regional and national assessments critical to the NOS mission and coastal stewardship; 3) Identifies and applies innovative techniques and technologies to enhance NOS national assessment and communication capabilities, which provide NOS with a suite of "national" level information products and services to offer its partners; and 4) Reaches out to partners and clients to help amplify the impact of agency priorities and the goals of coastal stewardship. Working both inside and outside of NOAA, SPO generates a variety of targeted products and services, among them: 1) National and regional coastal geographic assessment frameworks; 2) National and regional thematic data sets; 3) National and regional assessments on coastal topics and problems; and 4) Economic valuations of coastal resources. Reporting directly to the NOS Assistant Administrator, SPO can ensure NOS's capacity to quickly and effectively engage in important, emerging issues.

International Programs Office

NOS actively applies its scientific products and services internationally to fulfill its strategic goal of leadership in "coastal stewardship." The International Program Office (IPO) provides a single focal point for NOS-wide international activities and coordinates activities between NOS and national and foreign governmental agencies, non-governmental organizations, and donor organizations. The IPO also supports the international interests and responsibilities of the NOS Assistant Administrator and program offices and provides a bridge among NOS, its program offices, and the international coastal stewardship community.

OPERATING PRINCIPLES

To consistently provide rigorous, objective and innovative scientific support for coastal stewardship, NOS will adhere to the following operating principles:

Rigorous and objective science capability - NOS science and technology must nationally and internationally recognized as being high quality and free of bias.

Relevant science- Responsiveness to stakeholders will be a key component of NOS science. Stakeholders will be involved in discussions of short-term and long-term needs that science can help address. Stakeholders include local, state, and other federal agencies; the scientific community and other research institutions; and the private sector involved with coastal resources or ecosystems. This two-way dialogue allows operators and managers to identify their needs (short- and long-term); scientists to identify capabilities, existing and emerging issues, and scientific applicability; and all to discuss the needs for science to help reduce uncertainty in our understanding and management of coastal ecosystems.

Strong partnerships- NOAA's greatest strength is its ability and willingness to leverage its core scientific and management capabilities through internal and external partnerships to solve the nation's most complex environmental problems. NOS will serve as a primary catalyst for bringing together diverse groups to collaborate on high priority coastal science needs. Sharing information, people, and technology are essential components of this effort

Open Communication - To integrate and enhance the value of science to NOAA's operational, management, and policy needs, and to our external partners, all scientific efforts within NOS will operate under the principle of open communication and planning, cooperation and collaboration, and flexibility and adaptability.

ROLES & RESPONSIBILITIES OF THE SENIOR SCIENTIST

The NOS Senior Scientist will provide science leadership and coordination across NOS to ensure the rigor, objectivity, predictive ability, and effectiveness of its science. The NOS Senior Scientist will play a lead role in shaping and fostering scientific functions central to NOAA's coastal stewardship mandates. Building this comprehensive science agenda will require that the Senior Scientist lead the development of collaborative efforts and coordinated implementation among partners. Because of the cross-cutting nature of many NOAA science efforts, it is critical to the success of NOS that its Senior Scientist ensure full engagement with internal and external partners. This requires that open and continuous coordination mechanisms be established and vigorously pursued. Therefore, NOS will adopt the above operating principles to ensure effective interaction, coordination, reduce duplication, and enhanced leveraging of the diverse science capabilities throughout NOS and the broader NOAA.

Scientific Leadership and Coordination - The NOS Senior Scientist will provide

leadership within NOS to:

Identify and catalogue NOS science programs and expertise;

Establish NOS points of contact for interagency and intergovernmental science efforts;

Nurture scientific creativity, ingenuity, and advancement at all levels;

Develop an agenda for NOS science, including how NOS will undertake and guide its programs to fill critical needs;

Develop guidelines for establishing, facilitating, executing, and reviewing science objectives across NOS under commonly-agreed goals’;

Establish and chair the NOS Science Council;

Establish a coastal focus within the Senior Scientist Council of the NOAA Chief Scientists to ensure appropriate coordination of coastal science across NOAA;

Establish a coastal subgroup of the NOAA Science Advisory Board to advise the NOS Science Council and NOAA on coastal science issues; and

Provide a scientific information clearinghouse to distribute information on upcoming scientific events (e.g., conferences, workshops, seminars, publication, and media presentations).

Ensuring Scientific Quality and Relevance - The quality and relevance of NOS science must be assured at all times. The NOS Senior Scientist, with the NOS Science Council, will have lead responsibility to develop procedures to ensure scientific rigor, integrity, and relevance through a variety of means including:

Professional development that nurtures and values strong agency science capability through cross-cutting seminars and other training opportunities;

Encouraging independent research and publication; facilitating extramural funding opportunities; and developing incentives for producing peer reviewed publications;

Recognizing scientific professional awards; supporting advanced training and education; and developing staff exchange programs with academia, research institutions, and management and operational offices;

Defining annual and/or long-term outcomes based on established criteria for measuring success of NOS scientific activities;

Engaging in inter-laboratory and inter-agency comparisons to ensure that NOS’s science

programs are high quality and that its measurements are inter-comparable.

Use of independent peer reviews for investigator selection and periodic, independent formal reviews of programs, laboratories, and offices to ensure their procedures consistently produce and/or use high-quality science.